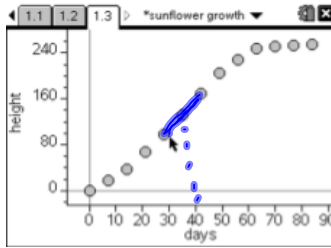


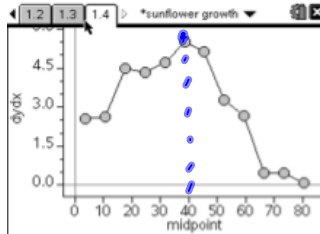
3.1b Derivative as a function - numerically and algebraically

Sunflower growth



days	height	midpoint
0	0	3.5
7	17.93	10.5
14	36.36	17.5
21	67.76	24.5

days	height	midpoint	dy/dx
0	0	3.5	2.56143
7	17.93	10.5	2.63286
14	36.36	17.5	4.48571
21	67.76	24.5	4.33429



When is the sunflower growing the fastest?

day 40

derivative

Sep 9-10:16 PM

Find the derivative of $y=1/x$ at $x=1$

$$x_1 = 1$$

$$y_1 = 1$$

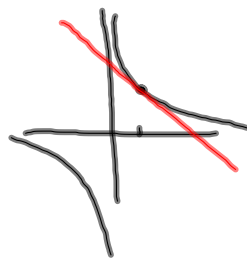
$$x_2 = 1+h$$

$$y_2 = \frac{1}{1+h}$$

$$f'(a) = \lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$$

$$\lim_{h \rightarrow 0} \frac{\frac{1}{1+h} - \frac{1}{1}}{h} = \lim_{h \rightarrow 0} \frac{1 - (1+h)}{h(1+h)} = \lim_{h \rightarrow 0} \frac{1 - (1+h)}{1+h} \cdot \frac{1}{h} = \lim_{h \rightarrow 0} \frac{-h}{(1+h)h}$$

$$= \lim_{h \rightarrow 0} \frac{-1}{1+h} = -1$$



Sep 9-10:41 PM

Find the derivative of $y = \sqrt{x+2}$ at $x=7$

$$x_1 = 7$$

$$y_1 = 3$$

$$x_2 = 7+h$$

$$y_2 = \sqrt{7+h+2} \\ = \sqrt{9+h}$$

$$\lim_{h \rightarrow 0} \frac{\sqrt{9+h} - 3}{h} \left(\frac{\sqrt{9+h} + 3}{\sqrt{9+h} + 3} \right)$$

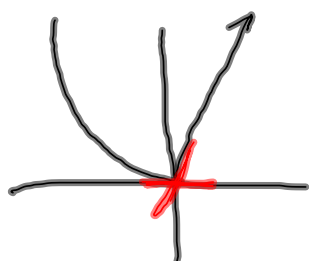
$\sqrt{9} = 3$

$$\lim_{h \rightarrow 0} \frac{9+h-9}{h(\sqrt{9+h}+3)} = \frac{1}{6}$$

Sep 10-11:27 AM

One-sided derivatives

Show that the following function has a left hand and a right hand derivative at $x=0$, but no derivative there.



$$f(x) = \begin{cases} x^2 & x \leq 0 \\ 2x & x > 0 \end{cases} \quad f'(0) = *$$

$$f'(0) = \lim_{h \rightarrow 0} \frac{f(0+h) - f(0)}{h}$$

$$\lim_{h \rightarrow 0^-} \frac{h^2 - 0}{h} = 0$$

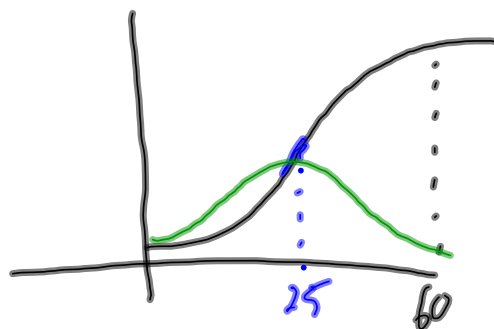
$$\lim_{h \rightarrow 0^+} \frac{2h - 0}{h} = 2$$

$$f'(0) = *$$

Sep 10-11:33 AM

Ex 5

people	prob
0	0
5	.027
10	.117
15	.253
.	.
.	.
.	.



Sep 14-10:25 AM